Level 0 TCU Input Bits

Bit	Set 1 – Minimum Bias & Central Research	Set 2 – Primary Data Taking	Set 3 – Auxiliary Data Taking	Special Requests
0	CTB Multiplicity > th0	CTB Multiplicity: 1	CTB Multiplicity: 1	Req. bit 0
1	CTB Multiplicity > th1	CTB Multiplicity: 2	CTB Multiplicity: 2	Req. bit 1
2	CTB Multiplicity > th2	BBC TAC diff in window	BBC TAC diff in window	Req. bit 2
3	BBC TAC diff in window	ZDC TAC diff in window	ZDC TAC diff in window	Detector ID bit 0
4	ZDC TAC diff in window	(BBC East$_{small}$ ADC> th) AND (BBC West$_{small}$ ADC> th)	(BBC East$_{small}$ ADC> th) AND (BBC West$_{small}$ ADC> th)	Detector ID bit 1
5	BBC East$_{small}$ ADC> th	(ZDC East ADC > th) AND (ZDC West ADC > th)	(ZDC East ADC > th) AND (ZDC West ADC > th)	Detector ID bit 2
6	BBC West$_{small}$ ADC> th	(ZDC East TAC in window) AND (ZDC West TAC in window)	(ZDC East TAC in window) AND (ZDC West TAC in window)	Detector ID bit 3
7	ZDC East ADC > th	ZDC E+W attenuated ADC sum > th	ZDC E+W attenuated ADC sum > th	Random Bit
8	ZDC West ADC > th	Zero Bias bit	Zero Bias bit	
9	ZDC East TAC in window	Blue + Yellow bunches filled	Blue + Yellow bunches filled	
10	ZDC West TAC in window	BEMC Hi-Tower: 1	BBC large ADC > th	
11	ZDC East+West attenuated ADC sum > th	BEMC Hi-Tower: 2	BEMC Hi-Tower: 2	
12	Zero Bias bit	EEMC Hi-Tower: 1	UPC	
13	Blue bunch filled	EEMC Hi-Tower: 2	EEMC Hi-Tower: 2	
14	Yellow bunch filled	FPD	J/Ψ	
15	Special Trigger Flag (Off)	Special Trigger Flag (Off)	Special Trigger Flag (Off)	Special Trigger Flag (On)

NOTE:

The Special Requests are common to all three sets

The 2 bits, CTB Multiplicity: 1 and CTB Multiplicity: 2, encode a number between 0 and 3 indicating which of 3 thresholds were exceeded.

The 2 bits, Hi-Tower: 1 and Hi-Tower: 2, encode a number between 0 and 3 indicating which of 3 thresholds were exceeded.

The UPC bit is calculated by putting a window around each ZDC ADC value (e.g. around the single neutron peak) and a window on the CTB multiplicity (e.g. to select valid low multiplicity events) and then combining these three bits with the CTB topology bit:

UPC = (Both ZDC ADCs in window) AND (CTB multiplicity in window OR topology bit set)

The Zero Bias bit is set every Nth bunch crossing, where N is defined from registers in the Run Control GUI

The Random Bit has an average rate that is also controlled from registers in the Run Control GUI